

# Geology of Greene County.

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Greene County is one of the largest counties in the State. It is bounded on the north by Clay and Owen Counties; on the east by Monroe and Lawrence Counties; on the south by Martin, Daviess and Knox Counties; and on the west by Sullivan County.

In shape the county approaches very closely the form of the rectangle, having a length of thirty miles, east and west, and a width of eighteen miles. However, from this rectangular shape there must be subtracted a strip nearly one-half mile in width and six miles long, from the south side of Stafford Township, which small strip is a part of Knox County. The county, therefore, comprises an area of about 534 square miles.

## ELEVATION.

A corps of United States engineers, under the direction of the Coast and Geodetic Survey, during the years of 1906 and 1907, conducted a number of surveys for precise leveling. This portion of Indiana was included in these surveys. Beginning at Owensburg, in the southeastern corner of the county, it was found that the top of the rail in front of the railroad station was 642 feet above sea level. Three hundred forty-three feet west of the station on the overhead bridge, south side of the track, in the top of a coping stone is a tablet stamped 641 feet above seal level. Following the railroad west to Dresden, another point of elevation is established. Here in front of the station, the top of the rail was found to be 570 feet above sea level. At Robison, some two miles further up the track, at the highway bridge on the south side of the railroad track there is fixed in the east abutment, an aluminum tablet stamped 543, while the top of the rail in front of the railway station was 540 feet. Nearly three miles north of Robison and in Center Township, at the church of the "Later Day Saints" or the "Temple" is another marker which indicates that this place is 755 feet above ocean level. At Cincinnati, a village in Center Township, some three miles northeast of the

last named placed and in the front yard of Mr. J. H. Neals, the government placed an iron marker, such as is used where a rock surface is not at hand. On this marker is stamped, Prim. Trav. Sta. No. 7, 880. This point is nearly 200 feet higher than any elevation in the counties surrounding Greene, and is the highest place in Greene County. Taking up again the line of leveling along the Chicago, Indianapolis, and Louisville Railway, the next point is Koleen, and here the top of the rail in front of the station is 521 feet above the sea. Three hundred and seventy feet north of the station is an iron post stamped 519, 1906. Two miles more at a point locally called Rockwood, and at the crossing of the public highway, the top of the rail is 517 feet. At Mineral City an iron post is used to mark a spot which is .38 of a mile east of the station near the road crossing, and is 509 feet, while the top of the rail in front of the station is 508 feet. Again, two and one-half miles northwest of Mineral City, near the railroad track and at a private road is another iron post, marking the place at 509 feet.

Two points of level were established in Bloomfield. The first, 120 feet west of the Monon station, an iron post is marked 534 feet, 1906, and a second one, not far away from the first, is stamped 541, 1906. Following this quadrangle, as made by the U. S. engineers, and we find at Elliston at the top of the rail in front of the station to be 508 feet. A second point, one and three-fourths miles north of Elliston, has an elevation of 503 feet. A third station, four and seven-tenths miles north of Elliston, and near the railroad track has an elevation of 506 feet. The last three elevations follow the toe path of the old Wabash and Erie Canal, indicating the feasibility of this means of transportation in early days.

There are two elevations for Worthington, the top of the rail of the railroad in front of the station and the other an aluminum tablet set in the Taylor building. These points are 522 and 526 feet, respectively. These two markers are also close to the path of the old canal and the difference in the elevations of these two markers as here given, and the elevations of the other three along the old canal to Elliston, suggest the necessity of locks when the canal was built. The higher ground near Worthington was thus overcome and a lock was placed just outside of the corporation of that place. Three and two-tenths miles north of Worthington, near the Terre Haute and Evansville track is the last point of elevation determined along this line. It is also close to the

old canal bed and has an elevation of 520 feet. All of these markers, beginning with Elliston, are on the west side of White River and are a fair index of the height of the land in the western part of the county.

The first five elevations named in this report are in the southeastern part of the county and are along the valley of Plummer Creek and indicate not only the height of the land in this section, but the elevation of the land in all the valleys of the eastern part of the county. The elevation of 754 feet north of Robison and the point of 880 feet at Cincinnati in Center Township may be taken as indicating the land elevations outside of the valleys for the portion of the county lying east of White River.

White River flows across the county from north to south, dividing it into two equal portions, the part east of the river being a few square miles the larger. There is, however, a great difference in the surface of the two sections. That portion of the county west of the river is comparatively level, as before stated, and will average 500 feet in height, while the eastern part will average 200 feet higher. The eastern part is very much broken and with hills ranging from 100 to 300 or more feet in height.

#### GEOLOGICAL FORMATIONS.

The geological formations, which are here and follow each other in regular order, are the sub-carboniferous limestone period; the millstone grit period; coal measure epoch; and the glacial epoch. The sub-carboniferous limestone underlies the whole county. It is made up of a number of strata, differing in thickness, color, and texture. Lying in between the layers of limestone are beds of shales of a few inches in thickness up to several feet. These limestones and shales make up a rock bed of very great depth as shown from the borings of a number of wells that have been put down in the county by persons prospecting for gas and oil.

The upper surface of the carboniferous limestone crops out at a comparatively few places in the county. On the north side, where the Indianapolis and Vincennes railway enters the county, a small cut was made for the roadbed for a few hundred feet. This cut reaches down into the limestone. The upper surface of this limestone is covered with a few feet of mantle rock, made up largely of drift. The farm lands on either side of this railroad cut consists of a few fields of level surfacing, conforming to the horizontal rock strata which is only a few feet beneath the surface.

About 500 feet north of the county line is Fish Creek in Owen County. Here the limestone rock is exposed for some distance along the bluff bank of the creek, and has a thickness of 15 to 20 feet. The limestone at this place represents probably the best example of the Chester group in the county and the only place observed where the limestone is not overlain with sandstone.

As the sub-carboniferous limestone consists almost wholly of sea formations, the numerous fossils present in this are mainly marine, though at most any place of outcrop the rock is usually so worn that it is not always easy to find a sufficient number of specimens of any one kind to determine them. The following, however, were made out *Pentremites pyri formis*, Hall, *Archimedes Wortheni*, *Productus carbonarius*. There were also numerous *encrinite* stems.

Going now to the other side of the county, and two miles north of Ownesburg, in Jackson Township, and we find there another outcrop. The place is known as the Sexon spring. Here the limestone is exposed horizontally for 100 feet and to a depth of 10 to 20 feet. Above the limestone is a sandstone, the millstone grit. This sandstone has a thickness of 50 feet. At the base of the limestone is fragmentary rock or talus to a depth of 10 feet, and altogether presenting a wall some 80 feet high, a very imposing and beautiful spot. Just below the junction of the sandstone and limestone there gushes forth a stream of water, a spring. The water flows over and through the talus, and has a drop of some 10 feet, coming forth in a clear stream of pure rushing water, some 6 inches deep and 8 feet wide.

The grounds about this spring have been placed in good order. The rustic seats, amid the profusion of wild flowers, invites you, on a summer day, to spend a few hours at this ideal place. The public highway passes these grounds and Mr. and Mrs. Sexon, whose residence is only 100 yards away, have cared for these premises for the benefit of the public, and the enjoyment it gives the owners. A hydraulic pump, placed at the spring, supplies the house with water and stock at the barn. The limestone at this place is a hard, durable rock and of a slightly blue cast. It does not contain a great number of fossils. There were a few fossils, *Pustula, alternatus*, and a few *encrinite* stems seen.

A second outcrop of this limestone to be seen in Jackson Township is found one mile north of Dresden in Sec. 17, and on the farm of Mr. Frank Edington. The limestone is exposed for 50 feet horizontally and has a depth of some 10 feet. Below this,

limestone is a mass of rubbish rock or talus, which has covered up some of the limestone. Above the limestone is a layer of sandstone, 40 to 50 feet in thickness. This, as in the former case, presents a precipice of bold front 75 feet high. Overhanging this massick rock are a number of native forest trees. At the edge of this glen are other trees, which help to preserve the freshness and beauty of this spot. There is also at this place, a spring. At the junction of the sandstone and limestone there bubbles forth a bountiful supply of cool water. It finds its way down through the rubbish rock, a descent of about 8 feet, where it forms quite a rapid current about 5 inches deep and 6 feet wide.

A third outcrop of limestone to be described in Jackson Township is known as the "rock spring" near the public highway, a mile east of Koleon. Here the limestone is seen in width, about 50 feet and in depth, 15 feet. Above this limestone is a layer of sandstone, 35 or 40 feet in thickness. At the middle point of the exposed limestone and 15 feet below, where the sandstone joins the limestone, there is a large spring. At this spring there is no rubbish rock, the water flowing away at the surface of the ground has probably carried away all fragmentary material that has fallen from above. The water, instead of flowing away at the junction of the sandstone and limestone, has no doubt cut its way down through the limestone at some place back in its course. This is one of the beautiful spots along that public highway. There are trees enough to conceal the place when a slight turn in the road brings you squarely in front of a wall of almost perpendicular rock, nearly 60 feet in height. A stream of water, 6 inches deep and 6 feet wide, flows away from this spring. The fossils in this limestone consisted almost wholly of encrinite stems and of various sizes.

In the western part of Center Township there is an interesting development of this limestone at a place known as Ray's Cave. The cave is some 60 rods from the public highway. In the highway there is quite an exposure of sandstone. On leaving the highway for the cave, the slope of the land is toward the cave. When you have traveled half way down this slope to the cave and at a point some 75 feet below the level of the highway you have just left, there is a small outcrop of limestone. This outcrop is only 2 feet wide, 6 feet long and 18 inches in thickness. This is what is known as the third limestone and is a thin layer of the Chester group and is found near the tops of the hills, where found at all. It is found at a few other places in the vicinity of Cincin-

nati. The outcrop of the third limestone in the vicinity of Ray's Cave contained one good specimen of the fossil *Archimedes Wortheni*, and one *Pentremites pyriformis*.

Below this limestone is a shale of several feet in thickness and below this, other shales and sandstone, which may be observed on continuing your course down this incline. When you reach the cave you are at a point at least 175 feet below the level of the highway. Here, in a ravine, is the cave. Across this ravine is an outcrop of sandstone, 25 feet in thickness. Overlying this sandstone is a mantle of clay, 8 to 10 feet in thickness. Below this sandstone is a limestone, 6 feet in thickness. It is well filled with fossils. The fossil *Composita argentia* is most plentiful. Below this there is a thin layer of limestone, only 8 inches in thickness and quite distinct from the layer above. Below this there is another layer, 18 inches in thickness, followed by another limestone some 25 feet in thickness, and largely concealed by talus. Below this there is a shale,  $2\frac{1}{2}$  feet thick. Here we have a bold mural precipice, nearly 80 feet in height and about it a well wooded grove.

#### THE CAVE.

At the top of the layer of limestone mentioned as 25 feet in thickness is a cave. This cave is 10 to 12 feet wide on the floor and 8 to 10 feet wide on the sides. The roof slopes upward and at the entrance, and for some distance, at quite a sharp angle at the center or apex. This cave extends underground for nearly a 1,000 feet and is quite uniform in structure throughout. You then reach a narrow point and crawling through this you may travel several hundred feet more. On the floor of the cave is a small stream of water about sufficient to cover the level floor. At the mouth of the cave the water trickles down through some 30 feet of rubbish rock, where it forms a small inlet. It is simply a spring, the water having cut its way back through the limestone rock in the long ages of the past. The only form of life observed within the cave was a few specimens of the brown bat, *Myotis lucifugus*, clinging to the walls of the cave near the entrance.

There is a cave in Highland Township, known as Ooley's cave, which also may be traversed for several hundred feet. Sections of rock strata, similar to that observed at Ray's cave, was seen in the eastern part of Beech Creek Township. This lower limestone is to be seen only in such places as herein described and in deep ravines, though places of exposure are not many.

The most extensive outcrop of this carboniferous limestone noted, is in the northeast corner of Richland Township, Sec. 3. It is the bluff bank of Beech Creek, on the north side of the creek and on the farm of Mr. Jonathan Helms. This outcrop extends east and west for a distance of nearly one-half mile, and with the overlying sandstone, form a perpendicular and overhanging wall more than 100 feet high. At each end of this outcrop the rock, in ages past, has given away through weathering and now the land forms a gentle slope to the creek. The stratas of limestone here in color, hardness, and thickness, resemble closely that of Ray's cave which is only 3 miles away. There are a few other outcrops of limestone along Beech Creek, but all of them are small. *Pentremites pyriformis*, Hall, seemed to be the most common of the fossils seen here.

The term carboniferous limestone, has been used in a general sense and comprising the rocks of this formation below the coals. The carboniferous rocks are, however, made up of a number of strata that are sometimes difficult of separation and they do not always bear the same name,—such differences as is sometimes met with in botany and zoology, in the naming of plants and animals by different authorities.

This basic limestone, in order of formation or outcrop, is often called the first limestone. Overlying this limestone and resting upon it usually are many feet of shales and sometimes sandstones, as in the vicinity of Ray's cave, where nearly 100 feet of such material rests on this first limestone. The second limestone does not appear to be present at this place. However, the second limestone may be observed two miles west of Ray's cave, on Sec. 15, in the eastern part of Richland Township, on the bluff bank of a small brook and at the roadside. Here for several years,, the sandstone had been quarried for building purposes. After cutting down some 15 feet along this hillside, the limestone was encountered. The junction of the limestone and sandstone is 40 feet above the level of the land below. The limestone has now been cut down to a depth of 15 feet and 60 feet long. Resting on this limestone above is a sandstone, which not many feet back of this artificial outcrop must have had a thickness of at least 30 feet. This limestone itself seemed to be resting on sandstone below but this could not be determined on account of the rubbish rock that had been cast down the hill, nor could it be determined whether the exposed sandstone at each end of this fragmentary mass was in its native place, or had been moved down the hill.

It probably rests on sandstone as this rock and shales below this limestone may be observed in the public highway, a short distance to the south. This limestone is almost free of fossils. But one specimen was observed of *Pentremites pyriformis*, Hall, a few *encrinite* stems and one specimen of *Temnscheilus greenense*. This last specimen was identified by Prof. J. W. Beede, of Indiana University, who says that this fossil has been described by "Miller and Gurley" and from Greene County only. I am also indebted to Dr. Beede for identifying other fossils named in this report.

This second limestone at this place, at the time of observation, was being crushed for road purposes. It is first quarried and broken into pieces, 8 to 10 inches in diameter. It is then put through a machine which reduces it to small fragments, suitable for road ballast, in place of gravel which cannot be had here. The machine was crushing from 50 to 75 cubic yards a day. Mr. Edward Slinkard, road superintendent for the county, says that many miles of road in the eastern part of the county had been dressed with this material. It is a hard blue crystalline stone and durable. In a year or two this dressing forms a solid smooth surface. This stone is being quarried near Cincinnati, in Center Township, also at one place in Jackson Township, and at another in Taylor Township, and all for the purpose of supplying a road dressing.

Those first and second limestones, especially the first, are the water bearing stratas and are the sources of many springs that are to be found over this section of the county and these springs, in a number of places, have determined the location of homes.

A large artificial outcrop of limestone was made in constructing the Indianapolis and Southern R. R. from Richland creek to the county line. In a distance of 10 miles there are several deep and long cuts through this rock, showing the several stratas and formations.

#### FOSSILS.

In several outcrops the only fossil to be seen, in any abundance, was *encrinite* stems. At one outcrop in Jackson Township, the fossil, *Diaphragmus elegans* made up a large part of the rock. On Sec. 12, west end of Center Township, at a small outcrop, the fossils *Productus evatus*, *Productus sp.* and *Pustula sp.* were the forms most plentiful. At Ray's cave, *Pustula genevievensis* and *Spirifer leidyi* were of frequent occurrence.



## THE MILLSTONE GRIT.

This is the oldest name used in the State reports when speaking of this formation, though aware that two other later names have been used, we have thought it best to use the name "Millstone Grit." Following the subcarboniferous epoch in regular series is the epoch known as the millstone grit. This is a massive sandstone, overlying the subcarboniferous limestones. These two immense formations lie one above the other, though occasionally separated by a thin seam of coal No. 1, and shale. In the large development, along Beech Creek, in Richland Township, at the west end of this huge rock wall there is a thin seam of coal No. 1, a mere trace. Along the Indianapolis and Vincennes railway, a mile north and east of Worthington, the millstone grit and the carboniferous limestone are separated by 12 or 15 feet of shales. At the top of these shales is a thin seam of fire clay, and above this, a thin seam of No. 1 coal, 2 to 4 inches in thickness. Resting on the coal is the massive sandstone. These two great formations, limestone and sandstone, seem to separate as the sides of the angle between them lengthens in going from the east side of the county to the west, while the angle itself is occupied with shales and coal No. 1. The millstone grit is not always one compact structure; but it is generally in two rock masses, separated from each other by a thin seam of coal No. 2, or a seam of shale or both. The shale may vary up to several feet in thickness. These two rock masses have also an angle of separation, the sides of the angle growing farther apart as you go westward. This sandstone covers the entire portion of the county east of White River, also that portion lying between White and Eel Rivers, in Jefferson Township. The western boundary of this stone may be traced in an irregular line, across the county.

Beginning at Johnstown, in Jefferson Township, there is a small outcrop in the public highway. A mile south of this at the Watts coal mine it has disappeared. Not far north of Worthington, at what is known as "Ball Knob," there is another outcrop in the public highway. This rock is also to be noticed in the hillside nearby. Going southwestward of here, to Sec. 24 of Jefferson Township, and Sec. 23 of Smith Township, on the roadside in Smith Township, there is an outcrop. The sandstone at this place has been used for road and building purposes for a number of years. There is a mantle rock of clay, 4 feet deep and a wall of sandstone, mostly in layers, 14 feet deep. The surface

of the land, for a mile north and south of this point, abruptly slopes to the south, showing that this sandstone formation has disappeared. In a coal mine which enters the hillside, 200 feet south of this outcrop, there is a clay roof merging into shale and covering the coal to a depth of 10 feet. In two abandoned mines, 200 and 400 feet north of this outcrop of sandstone, the same conditions were found, marking off quite definitely for a considerable distance the western edge of the millstone grit. It is presumed that the sand stone overlying the shales at these coal mines had given away in past time and had disappeared. On sections 24, 25, and 36, in the southwest part of Jefferson Township, is a high ridge of land. The east side of this ridge forms the valley side of an ancient river bed. This ridge slopes to the west and marking here also the western edge of the sandstone. On the southwest corner of Sec. 36, in Jefferson Township, and the north corner of Sec. 1, in Fairplay Township roadside, and in the road on the hill, is an outcrop of this sandstone, the outcrop in the road making it difficult to travel. This is the southern end of the ridge just mentioned. Just over the fence of the roadside, at this place, is an abandoned coal mine. This mine had been worked for many years and hundreds of tons of coal taken out. The coal seam was 34 inches thick with a good sandstone roof. Below the coal were thin seams of fire clay and shales, as may be seen along the roadside nearby.

Taking now a southwest course of four miles and no more rock is met with until you reach the railway cut, one and a half miles west of Switz City. Here, a cut was made for the roadbed, 30 feet deep and several hundred feet long. This cut is through a hill, which exposed a kettle-shaped formation of sandstone, about 400 feet long. Below the sandstone is a shale which outcrops at each end of the cut. The dip of the strata is to the west. One mile and a half direct south of this railway cut, and where the public highway between Sections 28 and 33, in Grant Township intersect, there is a small outcrop of the millstone grit. The few coal mines, however, between the last two stations named along the roadside, have good slate roofs. Going one mile south we reach the corporation of Lyons. Many deep wells have been put down in this corporation, and in each case have encountered slate as the first rock, which is everywhere overlaid with 9 to 12 feet of clay. Southwest of Lyons in the railway cut of the I. and V. railroad, a cut of 35 feet deep, the only rock material met with, is slate and that near the bottom of the cut, the same

slate formation that is found beneath the corporation of Lyons. The next point where the sandstone appears is directly south of Lyons, in Sec. 29, in Washington Township. Here is a piece of land, known to the people of that community as "Dog Island". It consists of about 100 acres. It is only three-fourths of a mile from White River, and at times of high water, this land is entirely surrounded by water. Some 20 acres of this "island" is crowned with sandstone which is overlaid with 10 to 20 feet of mantle rock. This sandstone outcrops in the highway. There is, however, a large mass of this rock to be seen on the hillside in the field on the east side of the road, thus completing the irregular line across the county.

Between this line and the river, and extending from the south line of the county to Worthington, the country is almost one continuous valley from three to five miles in width, and the richest and finest of farming country. There is an outcrop of sandstone at the Hicks church in Washington Township, and at a few places along White River in this township, also at Elliston, in Fairplay Township, and at Worthington, for a mile along the valley side. So it may be said that White River flows across the county on the western rim of the millstone grit.

The portion of the county, east of White River, consists of about 280 square miles. It is on the whole, one immense rock. This ponderous massive sandstone, the millstone grit has been worn and blasted by the rains and frosts for ages, reducing this rock to its present form, and giving us the scenic beauty of the eastern part of the county. All the streams have cut deep and wide valleys, all the tributaries, creeks, and brooks have cut down to the main streams. Deep gullies and rocky hillsides abound everywhere. Angular and perpendicular rock walls are a feature of the valley sides. But few roads follow the section lines, and hence take the course of least resistance. Some of the main ones are ridge roads, while others are valley roads. This sand rock was examined at a great many places, and it is seemingly all of the same texture, color, and binding material. It has been quarried at many places for building foundations, now replaced by cement. Many fence posts have been split from this rock and are in use on several farms.

There are many places in this part of the country with a broad valley enclosed by encircling hills and studied with groves, a farmhouse, fields of waving grain and running brooks, a landscape,

fit for the artists' brush, and as beautiful as is to be found in the state.

#### THE COAL MEASURE EPOCH.

This epoch often represents a rock formation of great depth. It is mainly a fresh water formation, in which stratas of shales and sandstones of various thickness usually predominate. The stratas alternate with seams of coal in no fixed order and indicate a rising and subsiding of the earth crust, covering a long period of time.

The coal of Greene County is found to be in six geological formations or numbers. The coal that is found on the east side of White River is coal No. 1 and No. 2. Coal of these formations is to be found at several places in Richland, Taylor, and Jackson Townships and of sufficient thickness to be mined for domestic purposes. It is usually a good black coal. Traces of coal No. 1. or in thin seams is to be found in Highland Township, along the bluff bank of the river. It is to be seen along the I. and V. railroad track, a mile northeast of Worthington, near the base of the bluff bank of the river. Coal No. 1 is found some three miles south of Worthington, on White River, at a point known as "Rock Ripple." When the river is low the coal can be mined at this place. The vein of coal is just under the water line and many tons have been dug out of the river, as told me by Mr. F. E. Dyer of Worthington.

Coal No. 1 lies near the limestone and coal No. 2 is found interlaced between the massive sandstones and ranges, 20 to 30 feet higher than coal No. 1. Along the western line of the sandstone outcrop in Jefferson Township, coal No. 2 is mined; also at the mines in eastern Smith Township and in the northwest corner of Fairplay Township. The seams of coal in these mines ranged from 30 to 40 inches in thickness. The coal that is mined in Grant Township is No. 3 coal, and extends to the Linton field. This vein in geological formation is above No. 2.

The character of the county is considerably changed and is quite different west of the irregular line, traced across the county from north to south, at the western limit of the millstone grit, not only in surface features, but in soil and in the geological formation as well.

We now come to the great coal fields of the county, which are in Stockton and Wright Townships. This has been one of the most productive in the state. Most of the coal mined in this district has been a No. 4 coal. Southeast of the city of Linton,

several hundred acres of No. 4 coal have been mined by the process of stripping. A powerful steam shovel removes the overlying mantle rock, averaging 30 feet in thickness, which consists of clay shale, flagging stones and drift. A second steam shovel and much smaller than the first, moves along on the surface of the coal and loads the coal in small cars after it had been loosened by charges of dynamite. Southeast of Jasonville, in Wright Township, there is another large section being mined by stripping. This is also a coal No. 4. The coal at this place would average 30 feet below the surface of the ground. This coal was in a bed, 4 feet thick, but the covering over the coal was too weak to mine in any other way. The material over the coal consisted of 7 feet of shale, above this, 5 feet of sandstone which readily broke up into fragments and was removed by the steam shovel. The sandstone was not continuous. Above this was other sandstones in thin layer, and above this, several feet of clay, which included a great deal of gravel, quartz pebbles, and small granite boulders.

Northwest of Linton, a third stripping machine was in operation, and there another large section had been worked over. There was first above the coal, a slate of a few feet in thickness. This slate changed to a shale at several places. This slate contained many pyrite boulders. Above this shale and slate was a limestone, 4 to 6 feet in thickness. Above this was a mantle of clay and drift, 10 to 20 feet in thickness. This drift contained granite pebbles of many colors. One very good specimen of chain coral, *Halysites catenulata*, was observed. This drift contained many granite boulders of good size. When a stripping machine is used the ground is left in a very uneven condition and not fit for farming, though the material thus dug up in many places contained shales and clays that would make a good brick. The coal taken at this place was No. 5. West of Linton, and near the county line, is a small area of No. 6 coal. At this place the coal No. 6 is at a depth of 50 feet; No. 5 coal is reached at a depth of 115 feet; and No. 4, at a depth of 175 feet. Mr. Lew F. Akre, of Linton, who has been a coal prospector and driller in this field for several years, kindly gave me the use of his record books in which he has carefully recorded the results of a large number of wells covering the whole field. In looking over these valuable and reliable records, it was observed that the rock formation of the western part of the county tips to the west, or a little south of west, about 50 feet to the mile. The eastern part of the county,

in its formation, is also inclined to the west, but the incline is not so great as in the western part of the county.

The Summit mine, two miles west of Linten, shows the following record:

Surface, 18 feet clay, drift.  
Blue shale, 46 feet.  
Black shale,  $1\frac{1}{2}$  feet.  
Black chip slate,  $2\frac{1}{2}$  feet.  
No. 4 coal rider vein, 1 foot, 9 inches.  
Fire clay, 2 feet.  
Dark sand shale, 4 feet.  
Sand rock, 14 feet 9 inches.  
Gray shale, 15 feet 9 inches.  
Coal No. 4, 5 feet 9 inches.  
Dark sand shale,  $24\frac{1}{2}$  feet.  
Black shale, 9 feet.  
Coal No. 3, rider vein, 1 foot 2 inches.  
Dark shale, 4 feet 4 inches.  
Coal No. 3, 1 foot 10 inches.  
Light shale, 6 inches.  
Limestone, 1 foot.  
Dark shale, 1 foot 9 inches.  
Coal, 11 inches.  
Gray shale, 3 feet.  
Coal, 9 inches.  
Fire clay, 7 feet 9 inches.  
Sand rock, 5 feet.  
Gray shale, 11 feet.  
The total is about 186 feet.

The following is the record of the Sponsler mine, about three miles southeast of Linten:

Surface, 9 feet.  
Yellow soft sand rock, 11 feet.  
Gray shale, 15 feet.  
Coal No. 4, 5 feet 6 inches.  
Gray shale, 8 feet 6 inches.  
Limestone, 1 foot 6 inches.  
Gray shale, 15 feet.  
Black shale, 8 feet 6 inches.  
Coal No. 3, 10 inches, (rider vein.)  
Fire clay, 2 feet 2 inches.  
Gray shale, 6 feet 3 inches.  
Coal No. 3, 10 inches.  
Gray shale, 4 inches.  
Sulphur rock, 10 inches.  
Gray shale, 7 feet 3 inches.  
Dark shale, 2 feet 9 inches.

Brown limestone and sulphur, 1 foot 7 inches.

Dark shale, 10 inches.

Coal No. 3, 1 foot 4 inches.

Dark fire clay, 2 feet.

The total depth is 101 feet.

It will be noticed that No. 3 coal splits up so that there is no workable vein. No. 3 coal has been mined in the Linton field at a few places and is the lowest coal mined in that field.

The following is the record for a hole drilled, three miles northwest of Linton, near the Atlas store for the Summit Coal Co.:

Surface, 12 feet.

Black shale, 9 feet.

Blue shale, 35 feet.

Sand rock, 12 feet.

Blue shale, 35 feet.

Dark shale, 1 foot.

Black limestone, 1 foot 6 inches.

Black chip slate, 2 feet 8 inches.

Coal No. 4, rider vein, 1 foot 7 inches.

Fire clay, 2 feet 3 inches.

Light sand shale, 10 feet.

Sand rock, 15 feet.

Gray shale, 14 feet.

Coal No. 4, 5 feet.

Dark sand shale, 1 foot.

Dark sand rock, 14 feet.

Dark gray shale, 9 feet.

Dark chip slate, 7 inches.

Coal No. 3, rider vein, 1 foot 4 inches.

White fire clay, 6 feet 4 inches.

Sand rock, 2 feet 6 inches.

Dark gray shale, 4 feet 6 inches.

Coal No. 3, 1 foot 2 inches.

Sand rock, 1 foot 6 inches.

Gray shale, 2 feet 8 inches.

Coal No. 3, 4 feet.

Dark gray shale, 1 foot.

The total depth is 212 feet.

It will be observed here that the No. 3 coal is split up.

#### PETROLEUM.

Eighteen wells have been put down in Washington Township by prospectors for oil. All of these holes have been drilled to a depth of 1,750 to 1,800 feet, including several feet in Trenton limestone. What is known as "oil sand" has been found in most

of them, but the result has been in most cases "dry holes." Four of these wells, however, are producing daily, a total of 10 to 12 barrels of a very high grade oil. One of the number is a gas well. The well was not what was hoped for, and the casing was pulled. From the hole has flowed, for eight years, quite a stream of salt water and escaping from this hole, along with the salt water, is the gas. This gas, separating at once from the water, has been burning almost continually for all these years. A flame from 10 to 15 feet high is produced by the escaping gas. Several attempts have been made to plug the hole, but without effect. Four other wells have been put down in other parts of the county, but have disappointed the projectors. In the well put down in Taylor Township, the Trenton rock was reached at a depth of 1,487 feet and showing oil at 1,567 feet, and the well abandoned at a depth of 1,642 feet. The rock formation, the Trenton limestone, in these wells is shown to incline strongly to the west.

#### DRAINAGE.

The tributaries of White River, in the eastern part of the county, are Jack's creek, and Goose creek which drain Highland Township. Richland Creek is the main tributary in the east part of the county. This stream enters the county in the northeast corner of Beech Creek Township, and leaving this township at the southwest corner, crossing Richland Township to the southwest corner, where it empties into White River. Plummer Creek, a branch of Richland Creek, drains the southern part of the county. Doan's Creek and Indian Creek, in the southeastern corner of the county, drains a few square miles of that section into the east fork of White River.

Ninety-five per cent of the eastern part of the county is drained into White River. On the west side of the county the main stream is Eel River, which enters White River, 3 miles south of the north line of the county. Ninety-five per cent of the western part of the county is drained, eastward and westward, into White River, through state ditches. In the northwest corner of the county the drainage is out of the county to the west. On account of the ruggedness of the land, east of White River, the water runs rapidly to the main streams.

White River takes an angular course across the county, winding its way through a valley about 36 miles long. It has a slight fall, taking the elevations furnished by the government for Worth-



ington and Elliston, most of the fall is at one place, which is at "Rock Ripple," a point 3 miles south of Worthington. Here the water has a fall of nearly 2 feet in a distance of 300 feet, and when the river is low there is only one point where you can cross the "ripple" with a row boat.

There is an evidence of quite a different drainage in a former geological age. Eel River probably emptied into White River at the point where Latta's Creek now flows into White River. There is a well defined river valley from Worthington to that point. In fact, when the water now becomes high in Eel River, the overflow reaches White River at that point. This valley is an alluvial deposit, 100 feet deep at Worthington, as was shown by the drillings for a water supply for that city. Between Elliston and a point, one and a half miles west of Switz City is a ridge of land or divide. This divide separated the water that flows to Latta's Creek ditch, or the Eel River of a former age from the waters south of this ridge which forms the headwaters of the Four Mile Marsh, Beehunter Marsh, and the Goosepond. There were former large areas of wet land, several miles in length and width. These have all been drained and now form some of the best land in the county. These three marshes are also alluvial deposits and range from 60 to 100 feet deep. In Washington Township, when the wells were put down in search of oil, the character of these alluvial deposits and depths were shown. They have for their valley sides all the characteristics of old river beds. The lower deposits of these old valleys consists of sands, clays, and coarse gravel. The Linton water works are at the head of the Beehunter valley. The several wells put down at this point show an abundance of sand and granite pebbles of all sizes, shape, texture, and color, up to 2 or 3 inches in diameter. A large section of the southwestern part of the county is made up of this alluvial deposit, and one of the most interesting things regarding this alluvial deposits, is that the bottom of these valleys is much lower than the present bed of White River; to which the surface from these alluvial valley lands flow.

At Worthington, Eel River, no doubt, during the glacial epoch changed its course. The valley sides between the two rivers becoming narrow, Eel River broke through this side wall and by an abrupt change, joined White River at a new place, 8 miles higher up in its course. The slope of the valley sides in this vicinity, as determined by the sandstone bluffs, indicate very plainly that Eel River has changed her course and probably

during the glacial period. At the junction there is a gravel bed, the extent of which was not known until developed by Mr. Z. P. East, of Worthington, after 10 years of continued and persistent effort. The task was started in 1906 by cable and clam shell bucket. The bucket dipped the gravel from the bed of the river and the load was then carried by trolley to cars. This process was found to be too slow and unsatisfactory, then a powerful pump was installed. It was then discovered that the river itself was in the way. At this place, White River winds in a strong S curve, but with the curves reversed. Mr. East then planned to change the channel of White River. The river flowed in a curve one and fourteen-hundredths of a mile long. By cutting across to both ends of the curves a new channel was made 2,200 feet long. In cutting this channel, it was discovered that the soils overlying the gravel had a depth of only 10 feet. It was also discovered, that in cutting this new channel, that there was a line of very tough silt lying across the proposed channel. This bed of silt was about 300 feet wide and exceedingly difficult to remove. It seemed to be an ancient bed of Eel River, following closely the ice age. This old bed, if such it be, is fully one-half of a mile ahead of where Eel River now flows into White River, the point of junction since the glacial epoch. The material in this old bed was so compact that it could be removed only by blasting. Between the old bed and the new cut off there is probably 80 to 100 acres of gravel. The gravel is known to be 50 feet deep, though it is being used at the present time only to a depth of 20 feet. The problem of securing machinery that will take the gravel from this greater depth is being considered. At present, a "10" centrifugal pump and flat gravity screens are used, thus leaving the gravel practically clean. Five to eighteen cars a day of 30 cubic yards capacity are being loaded with this gravel. The material is held in high favor by the Pennsylvania R. R. people, both for ballast and concrete purposes. This gravel is also popular with the road men for ballast. The gravel shows the action of water and ice, and is no doubt a deposit of the ice age, in conjunction with the force of the two rivers at this point, checking the further drifting of this material and causing it to accumulate here. No other bed of gravel has been discovered in the county, beneath any of the alluvial deposits, of any economic value.

#### GLACIAL EPOCH.

Evidence of the glacial epoch is to be seen at many places in

the county, especially in the western part. During the glacial epoch, there was strewn everywhere over the northern part of North America, fragmentary material of past geological ages. The continent must have been much higher than it is now. Intense cold must have prevailed. Ice sheets, such as exist in Greenland today, must have been formed. This great mass of ice, slowly moving southward, pushed with it the debris of former periods. This material moved by the ice is known as drift. It is made up of a mixture of clay, sand, gravel, and stones of all sizes, a mixture of dissimilar elements, unsorted and unstratified. This drift reached this far south. Granite pebbles and boulders, of various sizes are to be observed at several places. The sand and gravel, beneath the alluvial deposits everywhere in the county, must be considered a part of the drift. In the several hundred acres of land stripped for coal the glacial drift formed a large per cent of the material moved. Granite boulders of various texture and color, up to 2 feet in diameter, were noted at one point in Wright Township. A plentiful supply of clay mixed with pebbles, formed the basis of some of the ground stripped for coal. The drift is 10 to 20 feet deep over much of the extreme western part of the county. In the small streams at several places in Wright and Stockton Townships, granite boulders were observed. In some drift in Grant Township, a granite boulder, 2 feet in diameter, was noticed.

The ice sheet probably entered what is now Greene County from the north and west of White River, pushing its way to the south and filling in all the valleys of a former geological age with sands, clays, and gravels. These have since received rich alluvial deposits, making the fine farming country along the ancient valley of Eel River, and the large district in the southwestern part of the county. A microscopical examination of wood, taken from two wells at a depth of 60 and 100 feet respectively, in two of these valleys, shows that it is related to the pines and of an epoch long past.

East of White River, the evidence of a glacial drift is less certain, though it is present in a few places. There is one small terminal moraine on Sec. 25, in Highland Township. This sand and gravel bank is being used for road dressing.

#### FIRE CLAY.

The constant attendant of a coal seam is a thin seam of fire clay. The thickness of the seam of fire clay may vary and does

vary. At numerous places examined this fire clay strata was less than one inch, and sometimes only enough clay to show its presence. There is an area of this material underlying the corporation of Lyons, and extending north into Grant Township, one and one-half miles, and south of Lyons, more than a mile and comprising in all, a district of at least 4 square miles. It is a fire clay of considerable value.

Well No. 2 was put down in the school yard in Lyons, in 1912. There was a clay drift of 15 feet deep. Passing through this, a seam of black slate was encountered, which had a thickness of 14 feet. Under this was a seam of coal 3 feet, 2 inches in thickness and below this, a strata of fire clay, 4 feet, 10 inches in thickness. In a well, put down in the yard of the M. E. church parsonage in Lyons, in 1915, the same order of stratifications was encountered, but the fire clay here was found to be 7 feet in thickness. In another well, put down not far away, this clay was found to have a thickness of 12 feet. Everywhere in this field where wells have been put down, this fire clay has been found to be of good thickness, and at no great distance from the surface of the ground. In the southern part of this field, the clay is white. In the northern part, it has become a variegated yellow.

Samples of this clay have been sent to several places where it has been made into various articles. In each test the clay has been considered of the best quality. Samples were sent to Karls Bad, Austria, to be tested and was also pronounced a high grade material. It would seem from the several tests of this clay that have been made, that there is a fine opportunity here to develop a large industry.

A fire clay was found on the Hay's farm, near Worthington, in 1906, which proved to be excellent material for modeling. This clay has since been used with success, for this purpose in the schools there. The articles, when placed in a kiln, take on a fine finish.

#### ARCHAEOLOGY.

In considering this topic, only that phase of the subject will be considered, which relates to prehistoric man and some of the evidence of his existence. The Worthington mounds, which have been nearly all destroyed, covered the largest area of any in the county. The building of the railroads and business houses made it necessary to level them. There was a mound where the Exchange Bank now stands. This mound extended north some

300 feet and east of this point to the present site of the Stock Yards and north again to the I. and V. station. These mounds were about 9 feet in height as measured by Prof. John Collet, State Geologist, and published in his report in 1880. Prof. Collet estimated that 4,000 cubic yards of earth were necessary to make these mounds. There were three places on this mound which marked the vertices of the triangular shape, which made it appear as three mounds. This mound, at one point, contained a burial vault "8 feet long, 5 feet wide, and 3 feet deep, surrounded by a sand stone wall, 18 inches thick."

In 1878, the town authorities of Worthington found it necessary to remove a portion of the north side of this mound in order to make some improvements. In doing so, a few Indian graves were exposed. In completing the Indianapolis and Vincennes railroad in 1880, some more of the mound was removed to fill in the old Wabash and Erie Canal, along the track. In this case the interior of the mound was reached. Here was found a bed of ashes, some 10 or 12 feet square. Bones of various animals were observed and fragments of pottery, along with mussel and snail shells. The remains or fragments of quite a number of skeletons were found in a great circle about this ancient fire place. In this mound have been found various household implements, vases, images, also flints, flint knives, and one copper axe. This copper axe, on analysis, was found to contain copper, with a little iron and carbon showing its origin from the copper mines of the Lake Superior region. In 1898, other improvements were made near the railway station, and a further destruction of the mound followed. Among the several trinkets and articles dug up were two images. One of these images is at the present time owned by Dr. J. D. English, of Worthington. The image was probably 4 inches long when entire, now the lower portion is broken away. The image is that of a woman, the features are clear cut and well defined. The hair is in a roll on each side of the head, and fastened at the back of the head with cleverness and skill. The curves are symmetrical and artistic and, in all, it represents a piece of workmanship of high order. Dr. William H. Holmes, Head Curater of the National Museum at Washington, D. C., in a letter to Dr. English, of March 30, 1898, regards the image as one that had been made by the mound builders. The other image discovered at this time was about 8 inches in length, and is now in the State Museum. In one instance, the skull of a skeleton had the face covered with a piece of mica, and for what purpose can only be

conjectured. A few of the relics found are still in the possession of people at Worthington, but most of them have been scattered and some lost. Each county in the state should have at the county seat a museum, where the relics of prehistoric man and other objects of interest, might be kept for the benefit of future generations. About all that is left of the Worthington Mounds is a portion now occupied by the stock yards pens, and a portion of the bank along the right of way of the Indianapolis and Vincennes R. R. joining the stock yards. A quarter of a mile north of Worthington, near the right of way of the Terre Haute and Evansville railroad is another mound. This one is 50 feet in diameter and 8 feet high. The field has been in cultivation for several years and plowing has reduced the mound to its present height. One arrow point and several small pieces of flint were picked up on this mound on the day of visit, August, 1915.

Three and one-half miles south of Worthington, in Sec. 8, in Fairplay Township, stands the largest mound in the county. This mound is in a field near the roadside. The last visit there was in August, 1915. Mr. Daniel W. Solliday of Worthington, and an old citizen of the county visited this mound for the first time in 1870, and says that the mound and surrounding ground was at that time covered with a forest of black oak, that this timber was seen after cut away, converting the spot into farm lands. With his assistance, the mound was measured on this occasion. Though probably reduced much from its former height by plowing and working, the mound still has a height of 30 feet and a base diameter of 145 feet. The mound at this time was covered with standing corn and a fresh rain had cut gullies down between the rows of corn, exposing at different places, several fragments of human bones. Several human teeth and one flint arrow point were found. The mound has never been opened, though two or three persons, without permission, attempted it a few years ago. After finding some pottery, which by unskilled work was broken, they were compelled to replace the earth removed and close the mound. This mound stands so near two public highways and one railway that had it been left in its original condition, the timber not cut away, it would have been an object at the present, time, of the greatest interest and a witness of a wonderful people of the prehistoric past.

There are still to be seen in the county a few mounds, such as those across the White River, in Highland Township, and a few in Washington Township, near White River. In Washington

Township, in the spring of 1910, while digging a peat hole, a skeleton was found 2 feet below the surface. Along with the bones was a beautifully colored vase, which contained 6 long flint arrow points. The young man, digging the post hole was not aware of the obstruction until the vase was in fragments. The "find" was brought to me for examination. The vase was of the workmanship represented by the Indians, usually known as the mound builders, though there was no evidence of any mound at the place where the vase was discovered. The arrow points were unusually long, of the same size, form, texture, symmetry, and represented the highest skill in this art. They were all of the same color of flint.

There are a few good private collections of Indian relics in the county which are made up largely of flint arrow points, fleshers, axes, along with a few ornaments and articles of slate. In my own collection, consisting largely of arrow points of more than 300 in number, and all picked up on one farm in northern Indiana, these differences are noticeable. Those in the northern part of the state may be readily separated into five styles of manufacture, while those in this section fall into a smaller number of groups. Those in the northern part of the state are smaller size and average less in length. Those in this section seem to be made of a flint of different and better quality than those in the northern part. There are other differences, better seen than described.

#### NATURAL WONDERS.

There are a few natural wonders in the county, among which may be mentioned the big tree near Worthington. This tree is a large sycamore and has been pronounced the largest tree in the state. Competent authorities have also said that this tree is the largest shade tree in the United States. Descriptions and pictures have appeared in a number of publications in the state. It is truly a mammoth tree.

On the bluff bank of White River, one and one-half miles northeast of Worthington, in Sec. 15, in Jefferson Township, and near the Indianapolis and Vincennes railroad track, is what is known as the "Tea-table." This sand stonerock, somewhat in the form of a table, and about 12 feet square, crowns the bluff bank of White River at a height of nearly 100 feet. All the rest of the rock, which has at sometime surrounded this huge remnant, has worn away. By a little effort you may reach the top of this

rock from the west side. Here, you may view the country for a great distance. This rock bears many names. Some of them have been cut there by persons who have gone to their reward more than three-quarters of a century ago. This old sandstone table has been a witness to more than one geological age. Could this "table" speak it could tell us how long it took White River to make her valley, and how long ago it was when the ice sheet of the north pushed her cold fingers down into the valley, and when she withdrew them. It could tell us when the Indians came and first stood on this table and watched the rising sun and then saw it go down in the splendor and beauty of a western sky. This table is an interesting and notable place and attracts many visitors.

The caves, Ray's and Ooley's have been mentioned. Another natural feature of considerable interest is what is known as "Lost Creek," in Center Township. Here a small creek sinks into the ground and does not appear again for more than two miles.

#### SOIL.

Soil, from the standpoint of the farmer or gardener, is good or bad, according to what it will produce in the way of grasses, grains, or vegetables. Soil may also be considered in a casual way as sand or clay, according to the amount of sand or clay present. Soil, in general terms, may also be alluvial drift or vegetable. But the soil means more than these terms or definitions might imply. It is that thin covering of the land surface to be observed everywhere. This covering has been a very long time in the making, when mother earth pushed her children, the great rock surfaces, from the sea, the atmospheric agencies at once set to work to disintegrate the rock and to form soil. When there was soil enough, plants began to grow. The plants then added their energy to the task of rock destruction in the way of humic and humus acids. One geological age succeeded another, but the work of making soil went on. Not all the soil we have here was formed here, neither do we have here all that was made here. Some has been carried away, some has been brought to us from elsewhere, but what there is here is the most valuable asset we have.

There are very few places where the soil is where it was formed, in situ, and still resting upon the parent rock. All the rest has been shifted by wind, water, and gravity to some other point



than that of its formation. All that party of the county, west of White River, is more or less covered by drift. East of White River, for some distance, glacial effects may be observed but they are slight. In the eastern part of the county, where the country is much broken, all the valleys are narrow, but they contain a rich sandy loam and are very productive, while all the upland or stony land, which comprises quite an area is of little agricultural value. The covering is not deep, thinning out and exposing the rock mass. The poorest land of the eastern part of the county, in most cases, is still occupied by forests. About Worthington the soil is sandy loam. A mile and one-half northwest of Worthington there is another small area of sandy soil. A mile and a half northeast of Worthington, in Highland Township, is another area of this soil, and north and west of Bloomfield there is another district of this soil. All of these soils are generally used each year for growing melons and for this purpose are the finest of grounds, and large crops are harvested. There are a few places in the eastern part of the county where the soil contains some gravel. West of White River, from Worthington to Switz City, there is a valley of alluvial deposit in which there is considerable sand, making it a sandy loam. This loam also forms a large tract in Washington and Stafford Townships. Along White River, throughout its course across the county, there is a flood plain of alluvial deposit. This is a silt loam. The water some seasons causes a loss of crops, but the whole flood plain is wonderfully productive land and despite the occasional loss by high water, the land commands the highest prices. All this valley land is given over mostly to the growing of corn, year after year.

The Four Mile marsh in Washington and Fairplay Townships, the Beehunter marsh, and the Goosepond in Washington, Grant, and Stafford Townships presents other types of sand and silt loams. Their areas were formerly large marshes covered with brush and overflowed with water each season, have now all been drained and are under cultivation. These lands now produce large yields of corn. Peat soils are found at a few places, perhaps the largest area of this soil is to be found in the Beehunter marsh, where there is perhaps a thousand acres. There is another large area along Latta's Creek, in Grant Township, and small area on Sec. 12, Washington Township. This muck soil is not a pronounced type of its kind. There is a considerable mixture of other materials.

The most extensive soil type in the county is the yellow clay,

or Miami silt loam. It is a heavy soil. It makes up the large part of farm lands of the county east of White River, and also of the northwestern part of the county. This soil may vary some in color, but it is the same basic material. "It is this soil that presents problems of diversified farming. Wheat, oats, corn, clover, timothy, and some alfalfa and cowpeas are grown. Rotation in crops is practiced. All of this clay soil requires careful handling. Plowing, when too wet, solidifies and makes difficult to keep free from clods. It requires much tile draining, not so much to carry away the surplus water as to make the ground porous and admit the air. The humus of the soil is not abundant and commercial fertilizers must be applied to insure better crop yields. In the eastern part of the county there are places where the fields are "worn out" and have been abandoned and are now covered with growth of sassafras and persimmon brush. Occasionally, a field in this condition, may be seen in the western part of the county.

While there is much land in the eastern part of the county that is broken, poor, stony and of low value, it is all good for something. There are a few fine orchards in this section that are proving to be of considerable commercial value. As excellent a quality of fruit as is to be seen in the markets anywhere is grown.

This part of the county can be made one of the finest of fruit lands.

#### IRON ORE.

At the junction of the sandstone and limestone, an ore branch of Plummer Creek, also at the junction of the same rock along Richland Creek, there is a limestone ore of which 40 per cent is a good iron. This iron bearing rock is from 6 to 10 feet in thickness and at some places more than this. Seventy-five years ago, a furnace was built and the smelting of this iron began. This work continued for 15 years and more than 100 men had steady employment.

There is still an abundance of iron in this locality and no doubt, the day will come when this grade of ore will again be profitable to work and the smelting resumed.

#### BRICK.

When the Indianapolis and Southern railway was constructed across the county, a large cut was made for the road bed just outside the corporation of Bloomfield. This cut revealed the

presence of a large bed of shales and clays, suitable for making brick. A plant was built and a high grade of brick is manufactured. The plant now does a large business and carloads of this building material are sent to various sections of the country.

Greene county has a varied list of natural resources and interests and a number of them await development

OFFICE OF STATE SUPERVISOR OF NATURAL GAS.  
INDIANAPOLIS, IND., December 31, 1915.

*Hon. Edward Barrett, State Geologist,  
Indianapolis, Ind.*

Dear Sir:

I am sending you today the manuscript of the Annual Report for the 39th Annual Report of the Department of Geology.

Thanking you for the valuable suggestions and assistance I have received from you, I am,

Very truly yours,

FLOYD E. WRIGHT,  
State Supervisor of Natural Gas.